

The illustrated embodiment overcomes this by utilizing a user mode process to detect fiber channel devices on the SAN and to communicate this to the filter driver 354 (or other functionality operating in the kernel mode) via the Windows™ registry. More specifically, upon deployment of the SAN and/or at the final phases of host boot-up, the user mode process identifies ports to which fiber channel devices are connected and stores that information to the host registry. At early stages of a subsequent boot-up (which may occur some time later), a kernel mode process validates those registry entries. The filter driver 354 operates as discussed above, e.g., masking non-assigned fiber channel devices, but also taking into account invalidity determinations made by the kernel mode process. The user mode process is re-executed to regenerate the registry (and, as a consequence, eliminate invalid entries), issuing new claims for any devices that were improperly masked by the filter driver 354, e.g., on account of the kernel mode process invalidity determinations.

Referring to FIGURE 41, a process 374 executes on an exemplary host 12 in user mode under the Windows™ NT, Windows™ 2000 or other such operating system. The user mode process 374 collects information pertaining to the host's ports 382, and stores this to the Windows registry, or other persistent store 380 (e.g., a database) that can be subsequently accessed by the filter driver 354 or by other processes executing in the kernel mode. The collected information indicates each port's number, whether the port supports a fibre channel adapter, and verification data. In the illustrated embodiment, the latter comprises the name of the manufacturer of the port's driver software, e.g., as obtained from a standard location of the Windows™ registry (i.e.,

other than that portion of the registry corresponding to store 380), though other information can be used in addition or instead.

To determine which ports are connected to fiber channel devices, the illustrated user mode process 374 calls a common user mode library 376, e.g., of the type specified by the Storage Networking Industry Association (SNIA). The user mode process 374 identifies the host's other ports, i.e., those not connected to fiber channel devices, via the Windows™ registry (again, other than that portion of the registry corresponding to store 380).

The user mode process 374 executes on the host during deployment of the SAN agent software and each time the host 12 is booted-up, specifically, at a late phase of the boot-up.

During a next boot-up of the host, which may occur minutes, hours, days, weeks or even longer after the user mode process 374 was last executed (and, more significantly, after which the operator may have added, removed or switched devices and/or adaptors), the kernel level process 378 is executed on the host to validate the store 380. This insures that the fiber channel identifications made by the previously run user mode process 374 are valid and, therefore, can be properly used by the filter driver 354 later during (the same) boot-up, when the class driver 352 begins issuing claims to the port driver 356.

More specifically, the kernel mode process 378 (which may reside within or outside filter driver 354) compares the driver manufacture name maintained in the store 380 for each port against the corresponding data maintained in the standard location of the Windows™ registry (i.e., in the

same location previously used by the user mode process 374 to ascertain those names). For each port for which the comparison is favorable, the kernel mode process 378 stores a "valid" (or "not dirty") flag. Conversely, for each port for which the comparison is not favorable, the kernel mode process 378 stores an "invalid" (or "dirty") flag.

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In addition to the ports listed in store 380, the kernel mode process 378 detects whether the host is coupled to any other active ports. As above, this is accomplished via the standard location in the Windows™ registry. Ports identified in the standard location that are not in store 380 are treated as invalid (or dirty) in the discussion below.

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Subsequent to execution of the kernel mode process 378, the host operating system (class driver 352) begins making claims for devices attached to ports, as discussed above. The filter driver 354 (which also operates in kernel mode) responds by intercepting and selectively blocking those claims, also as discussed above. In order to determine whether a claim is potentially subject to blocking, i.e., whether it is a fiber channel device, the filter driver 354 retrieves from the store 380 the entry pertaining the port identified in each claim. This includes both the indication of whether the port is a fiber channel port (per the user mode process 374) and whether the entry has been validated (per the kernel mode process 378). The filter driver operates as discussed above, blocking claims for validated fiber channel devices that are not assigned to the host 12, while passing those for validated fiber channel devices that are. It also passes claims for devices that are validly indicated as not fiber channel. The filter driver utilizes the invalid determination of the kernel mode process 378 (as reflected by the store 380), for example, to pass claims to

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